

7. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

In addition to assessing the specific direct, indirect, and cumulative impacts of the proposed Project and alternatives, NEPA regulations require broader consideration of the irretrievable commitment of environmental resources and the relationship of short-term use of resources to the long-term sustained productivity of the environment. That analysis and disclosure is discussed in this section.

7.1 Relationship between Local Short-Term Uses of Man's Environment and Maintenance and Enhancement of Long-Term Productivity

NEPA regulations (40 CFR 1502.16) require that an EIS consider the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity—that is, whether the proposed Project or alternatives would result in short-term environmental effects (adverse or beneficial) to the detriment of achieving or maximizing the long-term productivity of those same resources. Short-term uses of the environment may include consumption of non-renewable resources or commitment of resources to a specific use. Long-term productivity refers to the continued sustainability of the resource. The analysis of short-term uses and long-term productivity is based on the impact analysis in Chapter 4, “Environmental Consequences.”

7.1.1 No Action Alternative

The No Action Alternative would result in continuation of the monitoring program for closure of the previously mined areas at the Haile Gold Mine site. No further irreversible and irretrievable commitments of resources would occur under the No Action Alternative.

7.1.2 Applicant's Proposed Project

The Applicant's Proposed Project is the conversion of a reclaimed and closed mine property to an open-pit gold mining operation. (Chapter 2 contains a summary of the project description, and Appendix A is the detailed description of the proposed Project.) This action would principally include;

- Suspension of ongoing site closure and monitoring activities;
- Relocation of existing heap leach piles;
- Installation and operation of a groundwater dewatering system surrounding the new pits;
- Removal and storage of surface soils and overburden in designated storage locations (growth media storage and OSAs),
- Installation of a Mill, tailings TSF, and specialized OSA for PAG overburden (Johnny's PAG);
- Installation of stormwater management facilities;
- Installation of water treatment facilities and discharges;
- Filling wetlands and streams that are located where new facilities are to be installed; and
- Installation of roads and other mining support facilities within the Project boundary.

After active mining has been completed (see Section 2.0 in the mine plan), the TSF and Johnny's PAG would be closed with an impermeable geo-membrane to prevent water infiltration, formation of acid

leachate, and seepage of acid mine drainage. These facilities would be constructed with a liner and underdrain system to capture any seepage from the closed cells. All other OSAs would be graded and revegetated to provide wildlife habitat. Some of the mined pits would be refilled with overburden, others would be allowed to refill from surface and groundwater sources to form permanent pit lakes. The Mill and other facilities not required for reclamation and closure would be removed.

Resources consumed or temporarily or permanently altered during mining and post-mining reclamation and closure are discussed below. Two categories evaluated in Chapter 4 (health and safety, and hazardous wastes and materials) are not environmental resources and are not subject to the tradeoff between short-term use and long-term productivity. Therefore, these two subjects are not evaluated in this section.

7.1.2.1 Soils and Geology

Removal and storage of overburden would irretrievably change the form of the affected geologic material from in-place to excavated and permanently stored material. However, the material properties (mineral constituents) would still be available for long-term use should an economically viable use be identified.

Removal of gold-bearing minerals from the open pits and processing would irretrievably consume the gold-bearing ore reserves. During processing, the non-gold-bearing ore would be converted to a fine-powdered form and permanently stored in the TSF after removal of the gold metal. The gold metal extracted from these ore reserves would enter the world's gold supply. For most uses, gold is not consumed and is extensively recycled; therefore, the short-term conversion of gold-bearing ore reserves to gold metal does not affect the long-term productivity of gold resources.

7.1.2.2 Groundwater and Water Quality

Pumping groundwater to dewater the mining pits would reduce groundwater levels up to approximately 506 feet (in Mine Year 7) and 842 feet (in Mine Year 12) at the Ledbetter Pit, where maximum drawdown would be required. The area affected by groundwater withdrawal would include almost all of the area within the Project boundary and some areas adjacent to the Project boundary. Following active mining when groundwater pumping is no longer required, groundwater levels would rise to near pre-mining levels but may not completely recover in all areas. The residual long-term incremental decline in groundwater levels could marginally diminish the groundwater resources available for water users and for support of baseflows in streams and wetland hydrology.

Exposure of pit highwalls during mining has the potential to generate changes in the quality of water infiltrating to the groundwater, especially following mining (see Section 4.3, "Groundwater Hydrology and Water Quality"). The changes in groundwater also may affect surface waters when groundwater levels recover and contribute to baseflows in Haile Gold Mine Creek and the Little Lynches River. As the pits are filled and pit lakes are formed during reclamation, potential changes to groundwater are expected to decline; any long-term effects on the sustainability of groundwater quality are expected to be minor.

7.1.2.3 Surface Water and Water Quality

Construction of the Ledbetter Pit, the TSF, Johnny's PAG, several of the OSAs, and other mine facilities would require filling many of the existing stream channels within the Project boundary. The filled stream channels would be permanently removed from the hydrologic system. Filling stream channels also irrevocably modifies the subwatershed and would increase runoff flows in the downstream reach of filled stream channels. These channels currently support surface waters flows that in turn support aquatic and riparian habitats whose productivity also would be permanently lost or altered. These watershed

modifications and related changes in flow regime would cause a major effect on the long-term flows in the affected streams and on the sustainability of the surface water hydrologic system.

Baseflows in Haile Gold Mine Creek and the Little Lynches River are partially supported by infiltration of groundwater. Reduction in groundwater levels during groundwater pumping to dewater the mine pits could reduce baseflows in these stream channels. When groundwater pumping stops after active mining, the groundwater aquifer is expected to recover for the most part; although groundwater levels in some areas would not fully recover to pre-mining levels. The groundwater contribution to baseflows similarly would be expected to largely recover and would result in a minor impact on the long-term sustainability of the flow regime in most streams.

Stormwater and wastewater treatment and resulting NPDES-based discharges, and changes to ground water quality would affect surface water quality. These impacts would occur downstream of the discharge point. Groundwater potentially affected by the mining pits would discharge to surface waters at the confluence of Haile Gold Mine Creek and the Little Lynches River. Moderate short-term and long-term impacts are expected to occur and would have a continuing effect on the long-term productivity, as it relates to water quality, on streams within the Project boundary and in the downstream portion of these streams outside the Project boundary.

7.1.2.4 Wetlands

Some wetlands would be filled and therefore permanently lost as a wetland resource. Where groundwater drawdown or stream flow reductions occur, associated wetlands may suffer total or partial loss of wetland function. If stream flow or groundwater changes are permanent a long-term loss of wetland function would occur. Where stream flows and/or groundwater levels recover after mining, wetland functions may be partially or fully restored. Effects of wetland filling and changes to groundwater levels and related effects on surface water flows that support wetlands is expected to have a major impact on the long-term sustainability of wetland resources.

7.1.2.5 Water Supply and Floodplains

During the period of groundwater withdrawal, the productivity of some water supply wells and agricultural ponds outside the Project boundary may be affected and may require mitigation (in the form of an alternative or improved water supply). Irrespective of mitigation, the groundwater aquifer is expected to mostly recover outside the Project boundary and the long-term effect on the sustainability of the groundwater as a water supply source would be minor.

No FEMA-designated floodplains occur within the Project boundary. Watershed alterations within the Project boundary would affect floodflows in designated floodplains downstream of the Project boundary. These flows would be marginally reduced, not increased. Therefore short-term or long-term effects on floodplains are not expected to occur.

7.1.2.6 Aquatic Resources

Changes to streamflows from permanent watershed alterations as described for surface waters would eliminate aquatic habitat and would result in major long-term effects on the sustainability of aquatic species in the Project boundary and in downstream reaches of affected streams.

Where streamflows are altered during the mining and reclamation periods because of watershed alterations or changes in baseflow contribution from reduced groundwater levels, changes in flow regime and water temperature also would occur reducing aquatic habitat and aquatic species. To the extent that

reduced streamflows recover subsequent to recovery of the groundwater aquifer within the Project boundary, aquatic habitat also could recover and some aquatic species may recolonize or repopulate affected habitat. However, it is unlikely that complete recovery of all affected aquatic habitats would occur, resulting in a minor long-term impact on the sustainability of aquatic resources.

7.1.2.7 Terrestrial Resources

The area within the Project boundary currently includes a reclaimed mine with vegetative cover except for roads and facilities, and in some isolated work areas. During active mining and post-mining closure, a large portion of the Project area would be disturbed, leading to short-term habitat loss and habitat fragmentation. Required reclamation activities would return much of the disturbed areas to a vegetated condition except for remaining roads and retained facilities. However, restoration of the TSF and Johnny's PAG would be limited to grassland vegetation types to protect the integrity of the closure capping system installed at these facilities. There could be a long-term change in the portion of the area within the Project boundary with grassland vegetation as opposed to forestland or mixed habitat. In the long term, however, successive changes in plant density and diversity would lead to habitat recovery and reconnection of some habitat elements. To the extent that a net change in the mix of vegetation would occur, the long-term distribution of terrestrial species and the sustainability of these species in the region may be altered.

Haile's Project design includes measures to deter terrestrial species from access to the TSF to limit exposure to WAD cyanide. In the post mining period the TSF would be closed and this exposure pathway would be eliminated. Therefore, while a short-term potential for minor impacts on avian and terrestrial species may be present, it would be eliminated after mining; and no long-term effect on the sustainability avian and terrestrial species would occur.

7.1.2.8 Federally and State-Listed Species

No federally listed species occur within the Project boundary or in the area adjacent to the proposed Project. Therefore, no short-term or long-term impacts would occur. The state-listed plant species *nestronia* (*Nestronia umbellula*) occurs within the Project boundary and would be removed during Project construction. The short-term loss of *nestronia* as a result of the project is not expected to adversely affect the long-term sustainability of this species within the local or regional area.

7.1.2.9 Socioeconomics

Construction and operation of the proposed Haile Gold Mine would directly employ from 250 to 510 people, depending on the mining year, and support additional indirect employment in the local area and region. This increased employment is expected to increase utilization of the local workforce, which would reduce local and regional unemployment to some extent. It would also increase commuting from outside the local four-county area. Increased employment would be short-term, primarily during the active mining period. Minor long-term changes in employment and economic activity could occur during the post-mining reclamation and closure period.

Project construction and operations activity would generate tax and fee revenue that would accrue to Lancaster County and to the State of South Carolina. This revenue would support increases in public services (law enforcement, public health, education, and social services) that might occur in the short term from increased employment and population changes that may occur in the local and regional area. Some tax and fee revenues would extend long term, while any increased demand for public services related to increased employment and economic activity would not.

7.1.2.10 Land Use

A portion of the Haile Gold Mine site is a reclaimed mine site; other portions are undisturbed land or are managed for other uses. All of the area within the Project boundary is zoned as a mining district. Construction and operation of the Haile Gold Mine would make the Project area unavailable for other uses during mining and the post-closure reclamation period. Following closure however, the mine site would continue to be available for future mining activities to the extent that feasible recoverable reserves are determined to exist. Because a portion of the existing identified reserves would be removed in the short term as part of the Project, the long-term use of the site for mining would be diminished.

7.1.2.11 Transportation

Construction and operation of the Haile Gold Mine include improvements to US 601 at the entrance to the mine property and two overpasses connecting areas within the Project boundary. The mine entrance improvements would accommodate additional worker traffic to the mine and trucks delivering materials and equipment. The increased traffic from worker trips and from deliveries of materials and equipment was not found to degrade the level of service on local or regional highways. Increased use of roadways would lead to increased maintenance requirements. However the percent increase in traffic volumes was found to be low that any changes in maintenance requirements could be accommodated within existing road maintenance programs. Therefore short-term increases in roadway traffic would not affect the long-term sustainability of the level of service in the roadway network.

Construction of the mine would require closure of three local roads and a portion of the state-maintained Haile Gold Mine Road, which crosses the southeastern portion of the in the Project boundary. These road closures would cause a long-term redistribution of vehicle traffic in the local roadway system. However the traffic density on these roads is very low so a relatively few number of trips would be rerouted and only minor effects on the roadway system are expected to occur in the short-term or long-term.

7.1.2.12 Cultural Resources

A number of cultural resource sites have been identified within the Project boundary. Many of these sites will be permanently impacted by disturbance during construction, operations and reclamation. Those that are disturbed would be irrevocably lost, but that loss would have a minor impact on the long-term sustainability of the local cultural heritage.

7.1.2.13 Visual Resources and Aesthetics

The existing Project area is characterized by rolling topography with residual vegetated topographic features (heap leach piles) from previous mining within the Project boundary. When completed, the OSAs and TSF would constitute new topographic features that would irretrievably alter the landscape. However, these features would be re-graded and vegetated during site reclamation; therefore, long-term effects on the sustainability of the region's visual character would be minor.

7.1.2.14 Recreation Resources

The area within the Project boundary presently supports some informal recreational uses, but no formal public recreation facilities. The area is presently zoned and used for mining activity; therefore, no short-term or long-term impacts to formal public recreation resources would occur. Following reclamation and closure, and with a change in the zoning designation, portions of the area within the Project boundary could support public recreation uses. Recreational opportunities would be precluded however in limited

areas (Johnny's PAG and the TSF) in perpetuity. Consequently, the long-term sustainability of recreation resources in the Project area would not be affected.

7.1.2.15 Air Quality

During mine construction and operations, equipment driven by internal combustion engines would be used for earth moving and related mining operations. All other prime motive force for the project would be electrical energy. During the short-term active mining period, operation of this equipment would emit criteria pollutants and GHGs to the atmosphere. Mining equipment, earth-moving equipment, and blasting and earth-moving activities also would generate particulate emissions to the atmosphere. Following reclamation activities that involved grading and facility closure, equipment operations and the associated emissions would be reduced. In the long term, air emissions and GHG emissions would continue at a very low level during the monitoring and maintenance period, and would not affect the long-term sustainability of air quality in the Project area or region.

Electrical energy used to drive motors and pumps and other electrical equipment during the active mining and post-mining reclamation periods would be provided by an electrical utility. The effects on atmospheric resources from generation of electricity supplied for construction and operation of the Haile Gold Mine would depend on the generation resource mix of the supplying utility and would change over time.

7.1.2.16 Noise and Vibration

Construction and operation of the Haile Gold Mine would generate noise from operation of equipment during mining and milling. Blasting and movement of heavy haul trucks would cause vibrations that can be transmitted into structures. Both noise and vibration levels would increase above existing background levels during mine construction and operation. Short-term noise levels would not affect sensitive receptors in the vicinity of the Project, and short-term vibration levels would not be sufficiently high to cause structural damage. Both noise and vibration levels would return to existing background levels after completion of active mining. Therefore, there would be no long-term impact on the sustainability of the ambient noise environment or structural stability from ground-transmitted vibration.

7.1.3 Modified Project Alternative

Operations of the Haile Gold Mine would be similar to those described for the Applicant's Proposed Project, with two exceptions: (1) the Ramona OSA would be smaller, reducing the amount of stream channel and wetlands directly affected by the Project; and (2) the Holly and Hock TSF borrow areas would be reused, once the required borrow material has been removed, for overburden storage. Therefore, the effects of short-term use of resources on long-term productivity under the Modified Project Alternative would be similar to the Applicant's Proposed Project, except that less permanent transformation of wetland and stream resources would occur.

7.2 Irretrievable and Irreversible Commitment of Resources with Implementation of the Proposed Action

Regulations in 40 CFR 1502.16 require that an EIS must identify, consider, and disclose any irreversible and irretrievable commitments of resources that would occur with implementation of the proposed action. Irreversible and irretrievable resource commitments are related to the use of non-renewable resources and the potential effects of such uses on future generations. *Irreversible* effects result primarily from use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. *Irretrievable* resource commitments involve the loss in value of an affected resource that

cannot be restored (e.g., extinction of a species listed as threatened or endangered, or loss or disturbance of a cultural resource).

The following resources would be irretrievable and irreversibly committed with implementation of the proposed Project (refer to Chapter 4 for a detailed discussion of the specific Project impacts):

- **Gold and Gold Ore (Soils and Geology)** – Gold-bearing ore reserves excavated from the mine pits and processed through the Mill could not be reconstituted as gold-bearing reserves. The ore, converted to tailings and stored in the TSF, would have some very small gold content but at a level too low to support further processing for further gold recovery. Some material stored as overburden also may contain gold-bearing minerals but at levels lower than are economically feasible to recover in the \$950 mine plan. The overburden could be recovered and processed in the future if more favorable economic conditions were to develop.
- **Wetlands and Streams** – Construction and operation of the proposed Project would include filling wetlands and streams to construct Project facilities. Filling wetlands and streams would irretrievably and irrevocably eliminate these resources and their hydrologic and water quality functions. This also would affect the viability of certain aquatic resources.
- **Aquatic Resources** – Wetlands and streams filled to construct Project facilities would irretrievably and irrevocably alter these resources, eliminating any associated aquatic habitat and support for aquatic species.
- **Terrestrial Resources** – Construction and operation of the proposed Project, in particular the mine pits, TSF, OSAs, roadways, and Mill facilities, would cause short-term and, in some cases, permanent disturbance and loss of terrestrial habitat. Following reclamation, some of the terrestrial habitat and functions would be recovered but limitations of the vegetation communities that can be used for reclamation of the TSF and Johnny's PAG would constitute a minor irretrievable and irreversible commitment of resources.
- **Cultural Resources** – Construction of the proposed Project would cause surface and subsurface disturbance, removing a number of historic resources. Resource removal would occur under an MOA that includes protocols for assessment of the resources to be removed and, in some cases, preservation of cultural artifacts.
- **Land Use** – Construction of the proposed Project involves establishing the TSF, OSAs, pit lakes, and other permanent topographic features that would preclude (1) access (in the case of the TSF and Johnny's PAG); and (2) future land use because of the steep slopes and permanent maintenance of the surface of these features or conversion of land surface to a water feature.
- **Visual Resources and Aesthetics** – As noted above for "Land Use," the Project would include construction of a TSF and several OSAs. Each of these would be pronounced and permanent topographic features within the landscape. The size and configuration of these features would contrast with the natural topography of the local and regional area. Reclamation and re-vegetation of these areas would lessen the contrast in the long term.

Transportation – Construction of the proposed Project would require closure and abandonment of four local roads and permanent re-routing of traffic currently using these roadways.

7.3 Adverse Environmental Impacts That Cannot Be Avoided if the Proposed Action Is Implemented

Regulations in 40 CFR 1502.1 and 1502.16 require disclosure of any adverse environmental impacts that cannot be avoided after implementation of mitigation measures. Major impacts were identified on surface

waters, wetlands, and aquatic species. These impacts would occur through filling of wetlands and streams, changes to streamflow regimes, and related effects on aquatic species. Impacts on cultural resources would occur where certain cultural resources would be eliminated by construction of the proposed Project. No other significant environmental impacts were identified that cannot be minimized, avoided, or mitigated by environmental protection features proposed as part of the Project or identified by the USACE as mitigation measures. All residual impacts were found to be minor to moderate.